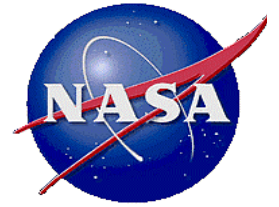


Safety and Mission Assurance Technical Excellence at NASA

**Presented at the
Technical Excellence Summit**

**NASA Safety Center, Ohio
July 23-24, 2008**

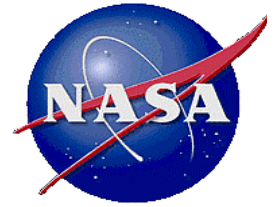
**Dr. Michael Stamatelatos, Director
Safety and Assurance Requirements Division
Office of Safety and Mission Assurance
NASA Headquarters**



Ancient Wisdom

**"We are what we repeatedly do.
Excellence, then, is not an act,
but a habit."**

Aristotle

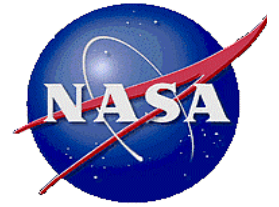


Dictionary Definition of Excellence

The state of possessing good qualities in an eminent degree

Extrapolating to “technical excellence”:

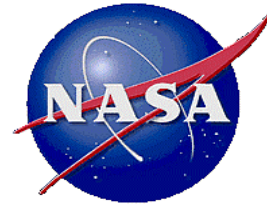
The state of possessing good technical qualities in an eminent degree



NESS on Technical Excellence and OSMA Commitment to the Administrator

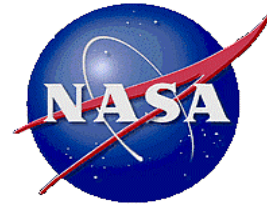
- **NESS:** OSMA should develop and implement a comprehensive “Technical Excellence” program
- **OSMA (O’Connor):** “Concur...plan to ensure compliance with OCE-led Technical Excellence by center SMA organizations, specifically the systems engineers in following disciplines:
 - ❑ System Safety Engineering
 - ❑ Reliability and Maintainability Engineering
 - ❑ Quality Engineering

and set up an equivalent program for Assurance, Ops. Safety, and Quality Inspector professionals”



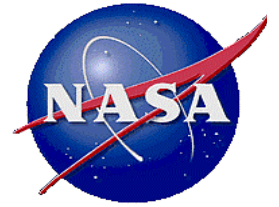
Additional Related SMA Initiatives

- **Improve SMA career development**
- **Create SMA Fellow Program**
- **Improve SMA capability in technical risk analysis and risk-informed decision making**



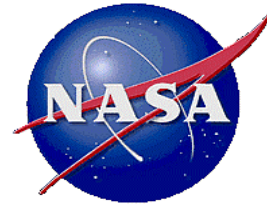
Two Types of Excellence

- **Excellent Organization** – A responsive, adaptive, innovative organization that fulfills its mission through leadership in state-of-the-art organizational practices.
- **Excellence of Individuals** – A product of organizational excellence, i.e., an excellent organization attracts, develops, and retains excellent individuals



Key Elements of Organizational Excellence

- **Management** – The “excellence” message comes from the top of the organization. Middle Management is a key element in the implementation level because they are in contact with both Top Management and the Personnel who deliver products and services.
- **Image** – What outsiders see when they look at the organization
- **Organization Infrastructure** – Excellence requires an excellent organization infrastructure that delivers beyond what is expected
- **Processes** – To guide and empower people and foster creativity within set limits of authority to produce superior products and services
- **Performance** – Clear definition of performance requirements and metrics
- **Research & Development** – Conducted to enable the organization to establish and maintain a lead position for products and services
- **Positive Communication** – Effective open communication between management and employees and among employees
- **Personnel Assignment** – Put the “right” people in the “right” positions



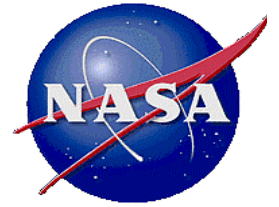
Development of Technical Excellence of Individuals



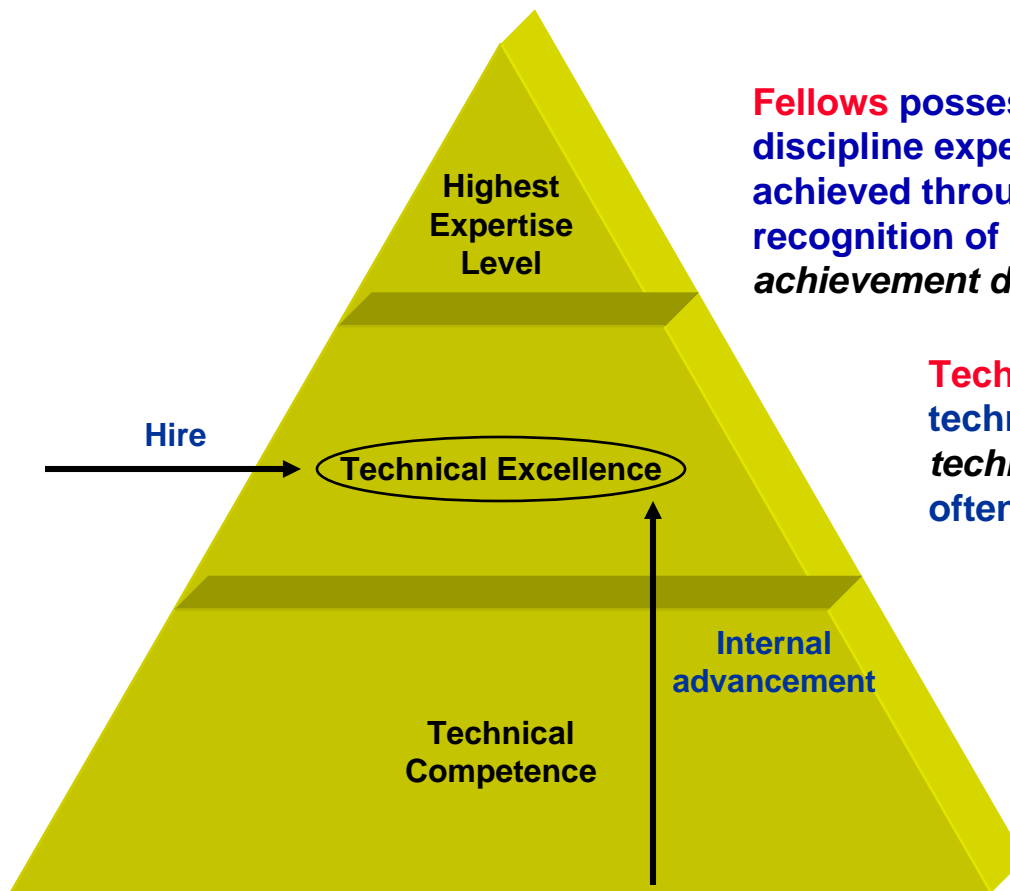
Fellows possess the highest level of technical discipline expertise. This level cannot be achieved through training. It emerges as a recognition of outstanding technical achievement during an entire career.

Technical Excellence is built upon technical competence. It begins after technical competence is satisfied. It is often defined in terms of attributes.

Technical Competence is the ability to perform necessary tasks for a technical discipline in order to meet performance requirements. It is often defined in terms of criteria that can be operationally defined and measured.



Acquisition of Technical Excellence of Individuals

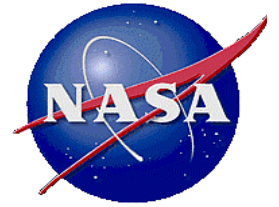


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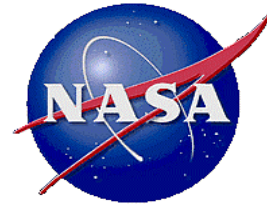
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Training is an input to competence acquisition



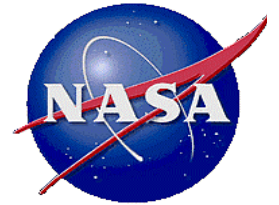
SMA Disciplines vs. Traditional Engineering Disciplines

- **SMA disciplines cut across traditional engineering disciplines and are application oriented**
- **Proficiency in SMA disciplines requires proficiency in science and engineering disciplines and in their the domains of application**
- **Colleges and universities generally lack formal training in SMA disciplines at undergraduate level**
- **Some but not many universities have graduate programs in selected SMA disciplines**
- **Because of the above conditions, high-level expertise in SMA disciplines is a rare commodity in the government and private industry**



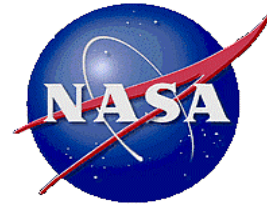
SMA Discipline Training Requirements to Assist in Development of Competence

- **Training of SMA disciplines requires instructors with established high credential in teaching, technical discipline knowledge, and domain knowledge**
- **SMA training cannot be effectively developed and delivered in isolation from organization policy, requirements and engineering domain knowledge**
- **Training by individuals unfamiliar with the above-mentioned organization policy and requirements will miss the mark because it will not be applicable and it will not satisfy organizational requirements and policy**



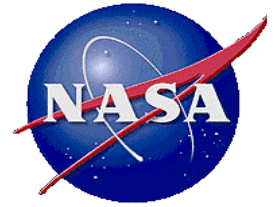
Proposed Near-Term SMA Training Plan

- **Establish training objectives and begin with the “low lying fruit”**
- **Establish a strong foundation by focusing on key introductory (“100 series”) courses to assist in the development of technical competence**
- **Review and update existing Web courses**
- **Build on existing specialized SMA courses. Use NASA subject matter experts to evaluate and update these courses. If necessary, use qualified outside consultants**
- **Take advantage of and expand applicable On-Demand training by universities (e.g. University of Maryland)**

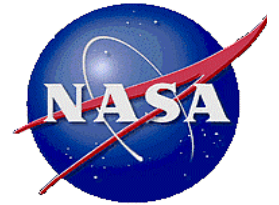


Overall SMA Excellence Goals

- Improve technical discipline (TD) expertise of SMA personnel in the Agency.
- Improve Agency posture with respect to TD expertise of civil servants. The Agency currently relies too heavily on contractors and consultants for technical work and very little on civil servants
- Enhance the Agency organizational excellence in order to attract, develop, and retain a higher level of TD expertise
- Support and strengthen the outside perception that NASA is a “**US Government Agency with one of the highest technical and technological capabilities**”



Backups



SMA Technical Fellow Selection Criteria

Organizational Criteria

- **Extensive proven experience in performing and leading technical work or managing technical tasks in the given Technical Discipline (TD)**
- **One or more recognized technical achievement/accomplishment in the TD that distinguishes the candidate from other practitioners**
- **Evidence of the candidate's advocacy/efforts to advance the TD in the Agency and outside**

Individual Criteria

- **Advanced engineering degree (MS or preferably Doctorate) or equivalent in the specific TD**
- **Authorship or co-authorship of technical reports in the TD**
- **Presenter of numerous technical papers in the TD at recognized technical conferences**
- **Author or co-author of peer refereed technical papers in prestigious technical journals,**

Agency-wide and Inter-Agency Criteria

- **Agency-wide, nationally and/or internationally recognized expert in given TD,**
- **Participation in national and/or international technical standards and expert review panels,**
- **Recipient of Agency, national, or international awards or prizes in a given TD,**
- **Program or technical chair or co-chair for major national and/or international technical conferences.**